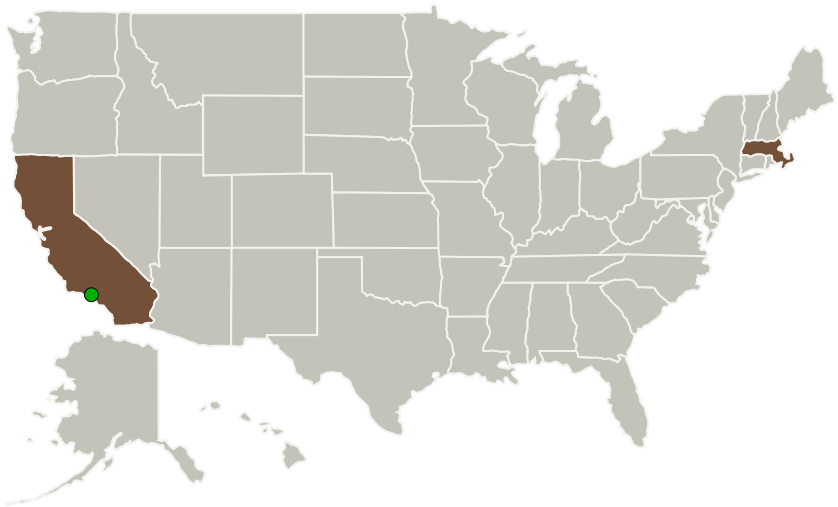
Compact Low-Power Driver for Deformable Mirror Systems, Phase II

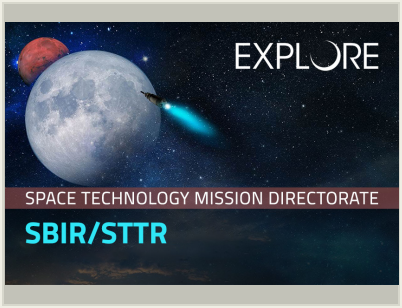
Completed Technology Project (2011 - 2013)

Project Introduction

This proposal describes a new concept to drive MEMS DMs using low-power, high-voltage multiplexing. Compared to other reported approaches, the proposed architecture will reduce power consumption by a factor of one hundred, to a level of a few hundred milliwatts. This estimate is supported by direct measurements obtained from prototype modules that were demonstrated in Phase I research. In the Phase II project we will scale up this innovative circuit DMs that Boston Micromachines Corporation (BMC) developed for NASA in support of the Terrestrial Planet Finding program. At the same time, we will reduce the driver's size in two successive stages of integration. In the first stage, we will implement a hybrid packaging approach in which a 993-actuator DM, HV amplifier, multiplexer components, and power supplies will all be co-located on a common multi-layered circuit board. With this driver we will demonstrate both low power consumption (~300mW) and high precision (~10pm). In the second stage of integration, we will design, fabricate, and test a High Voltage Application-Specific Integrated Circuit (HV-ASIC) version of the multiplexing architecture using a commercial foundry. We will combine a number of these 256 channel HV-ASIC modules into a driver for a 3063 actuator DM that is currently being developed by BMC to support NASA's coronography goals.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Boston Micromachines Corporation	Lead Organization	Industry	Cambridge, Massachusetts
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

June 2011: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138757)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Boston Micromachines Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Paul A Bierden

Co-Investigator:

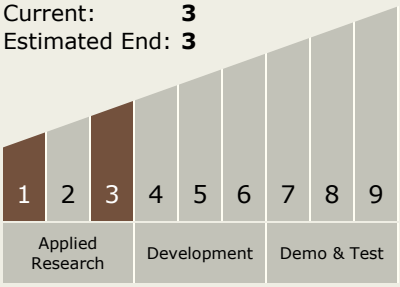
Paul Bierden

Compact Low-Power Driver for Deformable Mirror Systems, Phase II

Completed Technology Project (2011 - 2013)

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System